ARCS V

Remedial Activities at Uncontrolled Hazardous Waste Sites in Region V

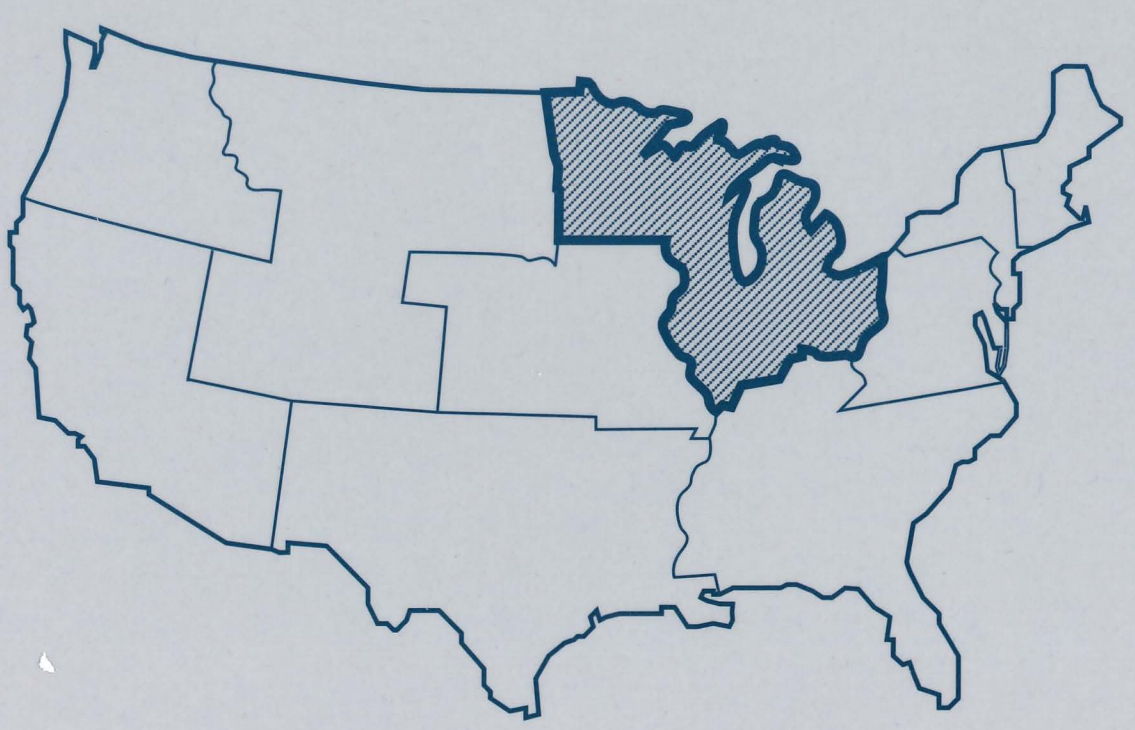
EPA United States Environmental Protection Agency

Remedial Action Report
Onalaska Municipal Landfill

Onalaska, Wisconsin

WA No. 47-5RL5 / Contract No. 68-W8-0040

September 19, 1995



CH2M HILL

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Section 1
Introduction

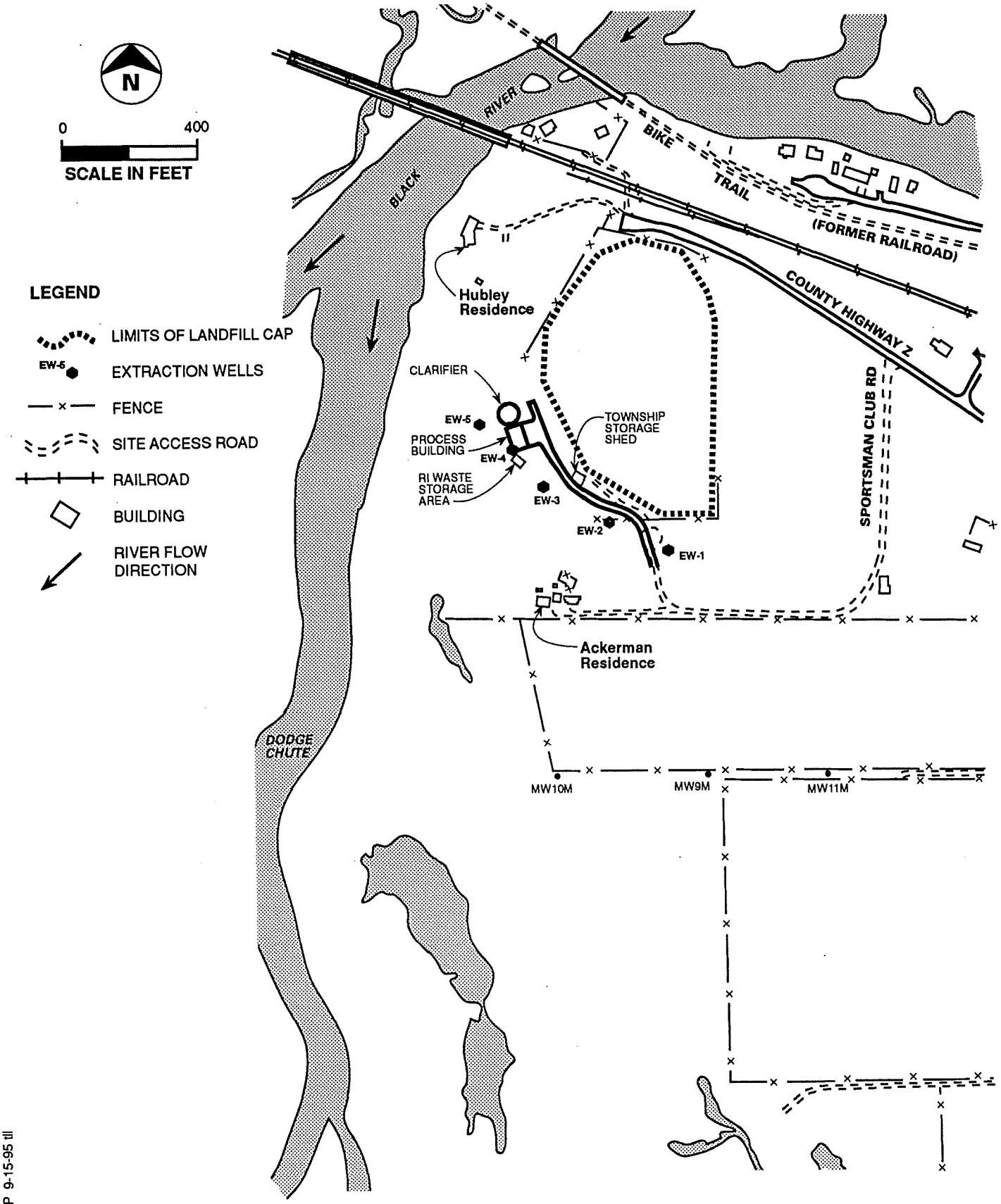
This remedial action report was prepared to document the completion of the Onalaska Municipal Landfill Remedial Action (RA). This report describes the activities performed under the Remedial Design (RD) and Remedial Action (RA) work assignments and how the work performed has met the remedial action objectives.

The Onalaska Municipal Landfill site is located in the township of Onalaska, La Crosse County, Wisconsin. The site consists of the Town of Onalaska's former municipal landfill, which is roughly 8 acres in area and about 15 feet deep, and adjacent property where the groundwater contaminant plume or naphtha contaminants have migrated. The site (Figure 1) was a sand and gravel quarry before it was used as a municipal landfill from the 1960s to the mid-1970s. Industrial wastes, including naphtha-based solvents, were also disposed of at the site. The solvents were usually hauled to the site in 55-gallon drums, the contents of which were dumped into the landfill and then covered with dirt. Fifty-five-gallon drums of waste solvents may also have been disposed of at the site.

The U.S. Environmental Protection Agency (USEPA) conducted a remedial investigation and feasibility study (RI/FS) at the site from April 1988 to December 1989. The RI determined that, as a result of waste disposal at the landfill, various chemical contaminants have been leaching into the groundwater and flowing towards the Black River. The Record of Decision (ROD) signed by USEPA on August 14, 1990, called for the following remedial action to protect human health and the environment:

- Design, construction, and operation and maintenance of a groundwater extraction, treatment, and discharge system to meet designated cleanup standards, and discharge requirements
- In situ bioremediation of the naphtha-contaminated soil, which results from naphtha floating on the groundwater table and emanating from the landfill
- Design, construction, and maintenance of a landfill cap meeting state requirements under applicable or relevant and appropriate law
- Periodic monitoring of groundwater, surface water, and sediments to ensure protection of human health an the environment

The remedial action was performed under EPA Contract No. 68-W8-0040. CH2M HILL acted as the prime contractor for remedial action. CH2M HILL executed the most of the construction through two subcontracts—the Landfill Cap Remedial Action, and the Groundwater Treatment Remedial Action. CH2M HILL also executed subcontracts to provide temporary treatment of groundwater treatment system effluent using activated



104194.PP.WP F2 SITE MAP 9-15-95 tll

FIGURE 1
SITE MAP
ONALASKA LANDFILL
Remedial Action Report

carbon, short-term (3-month) operation of the groundwater treatment system, and construction of a fence alongside a local grade school.

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Section 2
Chronology

The following list presents the major milestones in the design, construction, and startup of the remedial action.

Activity	Date
Remedial Design Work Assignment	April 1991
Cap Predesign Meeting with WDNR	November 25, 1991
Cap 60% Design	January 27, 1992
Cap Final Design	June 4, 1992
Cap Subcontract Issued for Bid	June 15, 1992
Request for Consent to Award	December 11, 1992
Cap Subcontract Award	February 22, 1993
Cap Subcontract Notice to Proceed	April 30, 1993
Cap Subcontractor Mobilization	May 3, 1993 (week of)
Cap Prefinal Inspection	November 18, 1993
Cap Substantial Completion	December 22, 1993
Cap Final Inspection	November 21, 1994
Biotreatment Bench Test Technical Memo	November 19, 1991
In Situ Biotreatment Predesign Report	January 31, 1992
GWT Predesign Report	October 1991
GWT Prefinal Design	March 31, 1992
GWT Final Design	August 7, 1992
GWT Subcontract Issued for Bid	October 16, 1992
Request for Consent to Award	March 16, 1993
GWT Subcontract Award	June 11, 1993
GWT Subcontract Notice to Proceed	July 9, 1993
GWT Mobilization	July 19, 1993 (week of)
GWT Startup	June 8, 1994
GWT Substantial Completion	June 15, 1994
GWT Prefinal Inspection	April 19, 1995
GWT Final Inspection	August 11, 1995

The original work assignment for the remedial action addressed the construction of the landfill cap. The Statement of Work was amended to include construction of the groundwater treatment (GWT) and in situ treatment systems, as well as operation of the treatment system for 3 months.

The design and construction activities proceeded in a timely manner without significant delay, except for the period between the issuance of the subcontract documents for bidding and subcontract award. The award of the two main subcontracts was delayed several months because of complications with obtaining access on properties adjacent to the site. Access was necessary for construction of the outfall pipeline and for construction of the landfill cap. After an agreement was reached between the Town of Onalaska and the property owners, access was granted and subcontractor procurement resumed.

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Section 3

Performance Standards and Construction Quality Control

Performance standards were developed and maintained for each of the three main construction activities (landfill cap, groundwater treatment, and in situ treatment).

Landfill Cap

For the landfill cap, the main performance standards were to regrade the existing cap and place a multilayer cap over it to reduce infiltration through waste. The ROD required that the cap be reconstructed to comply with NR 504.07. Quality control (QC) measures used during construction were described and documented in the Closure Report [1]. Construction QC testing was designed to verify that the materials used in construction met specifications and that the methods of construction were acceptable. The landfill cap subcontractor (Weston) conducted regular QC testing. CH2M HILL collected quality assurance (QA) samples at a small fraction of the frequency of Weston's QC samples as verification. A QC testing schedule was provided in Section 01400, Table 1 of the Landfill Cap Subcontract Documents [2]. The QA testing schedule is contained in the Construction Quality Assurance Plan [3]. The Closure Report documents how the QC testing verified compliance with specifications.

Some of the main QC tests included physical testing of the cap materials, in situ density testing as a means of verifying a low permeability condition was achieved, and surveying each of the cap layers to verify that appropriate grades were attained. Two clay test pads were constructed to demonstrate that the materials and methods proposed for constructing the clay barrier met the required limits for permeability. Shelby tube samples were collected from the test pads. Results of the permeability testing indicated permeabilities of the test pads ranged between 1.1×10^{-8} cm/s and 6.6×10^{-8} cm/s, demonstrating that the proposed material and methods would meet the NR 504 requirements. During construction, the moisture content and percent relative compaction served as a surrogate measure of permeability. The moisture content was not to fall outside the range used in the test pad construction, and 90 percent relative compaction had to be maintained. Test results that deviated from specifications were checked by performing a permeability test on a Shelby tube sample from the area in question.

Material for the sand drainage layer was obtained from the borrow pit on Sportsman's Club property. The Wisconsin Department of Natural Resources (WDNR) had suggested the borrow source be considered since it could be coordinated with a planned Dodge Chute dredging to be conducted by the WDNR later that year. Initial testing of the borrow source indicated that it did not meet specifications. After consultation with the WDNR and USEPA, it was decided that the source would be accepted.

Topsoil was imported from two sources because of its limited availability in the area. Topsoil outside the specifications was accepted after it was demonstrated that the imported topsoil was representative of topsoil in the area.

Seeding the cap followed specifications except that a dormant seed was applied and that the WDNR was allowed to add wild prairie grass seed to the mix to enhance indigenous species growth.

Groundwater Treatment

The performance standard for the groundwater collection system was to be capable of capturing contaminated groundwater emanating from the landfill. The extraction system was designed to capture groundwater upgradient from then southern property boundary expected to be emanating from the landfill. The limits of the zone of capture did not extend beyond the southern property boundary and any contaminated groundwater beyond this point was expected to naturally attenuate. Monitoring of drawdown in groundwater monitoring wells following startup of the treatment system demonstrated that the zone of influence of the extraction system achieved the desired range.

The performance goals for the treatment system was that it should be capable of achieving the goals of best available technology for VOCs and removal of iron, and meet the substantive requirements of an WPDES permit. Testing of effluent from the treatment system during the startup period documented that the treatment system met the best available technology goals and other effluent limits established by the WDNR.

Construction QC testing was designed to verify that the materials used in construction met specifications and that the methods of construction were acceptable. The groundwater treatment facility subcontractor (R. E. Wright) conducted QC testing as required by the specifications. CH2M HILL collected QA samples of concrete at a small fraction of the frequency of Wright's QC samples as verification. QC testing requirements for treatment system components were described in the related specification section of the Groundwater Treatment Subcontract Documents [4]. The QA testing schedule is contained in the Construction Quality Assurance Plan [5]. Resident inspectors witnessed and documented equipment performance tests.

In Situ Treatment

The in situ treatment system is designed to enhance the degradation of organic contaminants in the vadose zone immediately downgradient from the landfill. This area is known as the zone of NAPL contamination. No treatment standards or health-based cleanup criteria have been established for NAPL-contaminated soil at this site. However, the ROD defines a cleanup goal of 80 to 95 percent reduction of the organic contaminant mass in the soils. The organic contaminant mass is petroleum-based. Because the NAPL

contamination could act as a source of benzene, toluene, ethylbenzene, and xylene (BTEX) contaminants in groundwater, a secondary goal of the treatment system is to reduce the BTEX contaminant loading to the groundwater. No specific time has been established for accomplishment of the remedial action goals, although the ROD specifies that in situ bioremediation be performed for at least two 200-day treatment seasons. An oxygen uptake study conducted after treatment system startup [6] indicated that the treatment system was degrading hydrocarbon mass at a rate of 2 mg/kg/day, suggesting that the system might achieve the performance goals after about 800 days of operation.

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Section 4

Construction Activities

Two major subcontracts were awarded to implement the designs: a landfill cap subcontract, since it was mostly earthwork, and a groundwater treatment system subcontract, since it was mostly a building and process construction. The in situ treatment system was included in the groundwater treatment system subcontract since the blowers and piping were installed in the treatment building and because no special expertise was required to install and test the equipment.

Landfill Cap

Design of the landfill cap was completed before completion of the groundwater treatment system. Procurement of the landfill cap subcontractor was initiated before procurement of groundwater treatment subcontractor. Because the landfill cap work was largely earthwork and because of the proximity of the groundwater treatment building to the cap, the major earthwork associated with the treatment building area was included as part of the landfill cap subcontract.

Most of the landfill cap construction occurred during the months of May through November 1993. Some reseeding and regrading occurred in the spring of 1994. The landfill cap subcontractor mobilized during the week of May 3, 1993, and began clearing the site the last week of May. The major construction activities included regrading the site to increase the sideslopes to promote runoff and placement of the grading layer, a Type II geotextile, a 6-inch work surface, a 2-foot layer of compacted clay, a 1-foot sand drainage layer, a Type I geotextile, a 2-foot frost protection layer, and a 6-inch layer of topsoil. The cap was mulched and seeded in November 1993. A dormant seed, mixed with some native species collected by the local Boy Scouts, was introduced into the topsoil using a hydroseeder. Personal protective equipment and wastes generated during the RI were placed on top of the existing cap and covered by the new cap. The decontamination pad was removed in August 1994 and disposed of at the Minnesota Industrial Containment Facility (landfill) in Rosemount, Minnesota. The cap subcontractor demobilized in November 1993. The construction sequence is documented in detail in the Closure Report [1].

Construction of the landfill cap proceeded with few change orders. The requested changes amounted to less than 1 percent of the total final subcontract amount. There were no claims filed by the subcontractor on this project.

Of particular concern in the construction of the cap was the increase in volume of truck traffic through a neighborhood and past a grade school along County Highway Z. To reduce the potential for an accident involving one of the trucks, it was decided that a chain link fence would be erected between the school and County Highway Z to limit

pedestrian access to the school to one or two points. Truckers were cautioned to maintain the speed limit in these areas and that they would be closely monitored by the police and periodically by the construction inspector. No speeding violations or accidents were reported during the construction period.

Groundwater Treatment/In Situ Treatment

The groundwater/in situ treatment subcontractor mobilized during the week of July 19, 1993. The major construction activities included construction of the treatment building, construction of the clarifier, and construction of the outfall. Time and season were critical factors in the construction of these components. The structural components of the building and clarifier were completed in November, just before the onset of winter. This permitted the interior work to continue through the harsh winter weather.

The outfall required excavating across an intermittent river channel in as brief a period as possible to limit the quantity dewatering needed. Because of the high water table and sandy soil, dewatering of the pipe trench was a major concern that presented the greatest potential for construction claims. A particularly wet summer required that the work be done later in the fall than originally anticipated, leaving a narrow window of opportunity in November to install the pipeline before winter weather set in. A well-point system consisting of a series of well points spaced 2 feet apart was installed along the proposed pipe trench to provide the necessary dewatering. Although the area being dewatered was believed to be outside the contaminant plume, a simple treatment system (air sparging tank and cascade aerator) was constructed as a precautionary measure.

The dewatering system proved to be effective in lowering the water level to within 1 foot of the desired elevation. Several different approaches were undertaken to try to lower the water table 1 foot more, but after these were exhausted a field decision was made to install the pipeline at an elevation about 1 foot above the design height. This height should provide ample clearance for further dredging activities as long the dredging work is conducted by a party aware of the location of the outfall pipe.

Construction of the treatment system proceeded with few change orders. The requested changes amounted to less than 2 percent of the total final subcontract amount. There were no claims filed by the subcontractor on this project.

Health and safety aspects of construction of both the cap and groundwater treatment facility were monitored closely and no injuries occurred during the work.

Lessons Learned

Although both the design and construction of the remedial action proceeded very close to as planned, there were several aspects of the work that could be classified as "lessons learned."

1. Time invested in preparing detailed bidding documents helped to reduce potential claims and change orders during the construction phase.

2. Use of the two-step sealed bidding process to procure subcontractors helped to ensure procurement of subcontractors who were fully capable of performing the work.

3. Gaining access (construction easements) to adjoining property was more difficult and involved process than anticipated. Because the USEPA and WDNR had no direct mechanism in place for compensating land owners for use of their property, gaining access depended on reaching a settlement with the Town of Onalaska to compensate the land owners. This indirect approach was ultimately effective, but delayed the project slightly.

4. Public relations, a critical element of any construction project, was a particularly sensitive issue on this project. It was beneficial to have experienced construction managers at the site to deal with unexpected visits from media and to assuage owners of adjoining properties.

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Section 5
Prefinal and Final Inspections

On November 18, 1993, the Work Assignment Manager (Kevin Adler), the Site Manager (Steve Keith/CH2M HILL), and a WDNR representative (Ed Brick) toured the site as part of a prefinal inspection for the landfill cap. At that time the work was complete excluding fencing and vent caps. Work on the fencing and vent cap was completed in spring of 1994. A final inspection of the landfill cap was conducted on November 21, 1994. Present for the inspection were Kevin Adler/USEPA, Paul Kozol/WDNR, and Steve Keith/CH2M HILL. No significant issues were identified other than replacement of several dead plantings west of the capped area. The plantings were covered under warranty and were replaced in the spring of 1995.

On April 19, 1995, a prefinal inspection of the groundwater treatment facility was conducted. Present were representatives from the USEPA (Kevin Adler), the WDNR (P. Kozol and L. Lester), and CH2M HILL (Steve Keith). The major items on the inspection punchlist were the installation of three piezometers. The three piezometers could not be installed during the period when the GWT subcontractor was at the site because the town had not acquired the property where the piezometers were to be installed and the owners were not receptive to installation without compensation. A final inspection of the groundwater treatment facility was conducted on August 11, 1995. Present at the inspection were representatives from the USEPA (Kevin Adler), WDNR (P. Kozol and L. Lester), and CH2M HILL (Steve Keith). All the punchlist items were addressed.

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Section 6
Certification of Functionality

Substantial completion for the groundwater treatment facility was defined as operation of the system for 5 consecutive days without a significant downtime period, and demonstrating the system could meet the performance criteria for iron and BTEX during the period. By June 15, 1994, the treatment system had been operated for 5 consecutive days without significant downtime. Removal efficiencies were within the performance criteria of more than 95 percent removal of BTEX and more than 50 percent removal of iron. By indicating that the system was substantially complete, it was acknowledged to be operational and functional. Treatment plant effluent continues to be monitored routinely and discharge monitoring reports are submitted monthly to the WDNR.

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Section 7
Operation and Maintenance Plans

Operation and Maintenance (O&M) Plans have been prepared for both the landfill cap and the groundwater treatment system (including the air blowers for the in situ treatment system). The O&M manual for the cap [7] describes the recommended inspections, maintenance, and grass cutting. Two separate manuals were prepared for the GWT system: a summary manual [8] that provides a concise description of the treatment system and the major equipment, and the detailed O&M manual, which includes manufacturers' literature. Copies of the detailed manuals are retained at the treatment facility and at the CH2M HILL site manager's office in Milwaukee.

In addition to the O&M manuals, a Groundwater Monitoring Plan [9] was prepared to address how groundwater will be monitored to assess the effectiveness of the groundwater collection system.

No specific problems are anticipated with the maintenance of the landfill cap. A combination of mild slopes and established vegetation significantly reduces the potential for erosion.

Potential problems with the operation of the treatment system include biological fouling of extraction well screens, settleability of iron precipitants, and buildup of iron on air stripper packing. Biological fouling has not been observed to be a problem in more than a year of operation. The latter two issues are related, since the removal of iron in the clarifier helps to reduce the potential for buildup in the stripper. The installation of the polymer system (being installed under the Long-Term Response Action Work Assignment) should help to reduce potential problems associated with iron.

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Section 8
Summary of Project Costs

The FS estimated the total cost of the remedial design and remedial action for the cap to be $1.5 million and the cost of the remedial design and remedial action for the groundwater treatment/in situ treatment to be $3.6 million. The FS costs, however, made several assumptions regarding the design that were different from the final design. The significant differences were the design capacity if the groundwater treatment facility increased from 150 to 800 gpm, the cap was to include a drainage layer, and a passive landfill gas collection trench was to be constructed all around the cap. The FS cost estimate did not include treatability testing as part of the design phase.

The cap and groundwater treatment systems were bid separately. A two-step bidding process was employed to limit the bidding to prospective subcontractors qualified to perform the work. The lowest responsive responsible bidder for the landfill cap was Roy R. Weston, Inc. The lowest responsive responsible bidder for the groundwater treatment system was R. E. Wright Associates, Inc. The subcontracts were awarded to these bidders. A comparison of the engineer's estimate to the subcontract award amount and actual final amount is presented below:

Subcontract	Award Amount	Engineer's Estimate	Actual Final Amount
Landfill Cap	$2,304,529.10	$2,473,159.00	$2,021,690.39
Groundwater Treatment	$2,576,88.40	$2,790,597.29	$2,611,234.72

The bid amounts for the three low bids for each of the two major subcontracts were relatively close to one another and to the engineer's estimate. This was a positive outcome since it reflected the bidders' clear understanding of the subcontract documents.

Contract change orders for the landfill cap were less than $10,000, mostly due to a single change order to accelerate treatment building subgrade construction because of problems with property access that were beyond CH2M HILL's control. The landfill cap final construction costs totalled about $283,000 less than the original subcontract amount, largely because a lower quantity of clay was required than originally estimated.

Contract change orders for the groundwater treatment system were less than $40,000. The groundwater treatment final construction costs totalled about $34,000 more than the original subcontract amount.

Total project costs for the remedial action work assignment were less than originally planned. The approved work plan budget (per Work Assignment Form 8), included a budget of $7,253,164. Following completion of most of the construction activities a Work Plan Revision Request was submitted, and the approved budget was decreased to $6,711,238. Current projections suggest that the work assignment will be completed for less than $6,500,000.

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References

1. CH2M HILL. *Closure Report, Onalaska Municipal Landfill Cap Remedial Action.* Prepared for USEPA. December 1994.

2. CH2M HILL. Subcontract Documents for the Landfill Cap Remedial Action. June 4, 1992 (addendums excluded).

3. CH2M HILL. *Construction Quality Assurance Plan, Landfill Cap Remedial Action, Onalaska Municipal Landfill Site.* June 1992.

4. CH2M HILL. Subcontract Documents for the Groundwater Treatment Remedial Action. October 26, 1992 (addendums excluded).

5. CH2M HILL. *Construction Quality Assurance Plan, Groundwater Treatment Remedial Action.* March 1992.

6. CH2M HILL. *In Situ Bioremediation Startup Report, Onalaska Municipal Landfill.* Prepared for USEPA. September 1994.

7. CH2M HILL. *Operation and Maintenance Plan, Landfill Cap.* April 1992.

8. CH2M HILL. *Operation and Maintenance Summary Manual.* August 1994.

9. CH2M HILL. *Groundwater Monitoring Plan, Onalaska Municipal Landfill Site.* Prepared for USEPA. Revised March 1995.